

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Hideyasu MATSUMURA et al.

Confirmation No. 4013
Group Art Unit : 1796

Appl. No. : 10/540,866

Examiner : Winkler, Melissa A

I.A. Filed : March 22, 2004

For : EXPANDABLE RESIN BEADS OF STYRENE-MODIFIED, STRAIGHT
CHAIN, AND LOW-DENSITY POLYETHYLENE, PROCESS FOR THE
PRODUCTION THEREOF, PRE-EXPANDED BEADS AND
EXPANDED MOLDED ARTICLE

AMENDMENT UNDER 37 C.F.R. § 1.114

Commissioner of Patents
U.S. Patent and Trademark Office
Customer Service Window, Mail Stop RCE
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

In response to the Decision of the Board of Patent Appeals and Interferences of September 28, 2009 with which the rejection of claims 1-4, 6-8 and 11-16 was reversed Applicants hereby request that the examination of the present application be continued and the instant Amendment be entered and considered. Applicants are concurrently filing a Request for Continued Examination, together with a payment of the requisite fee. However, should any additional fees be deemed necessary, the U.S. Patent and Trademark Office is hereby authorized to charge Deposit Account No. 19-0089 any fee which is necessary to preserve the pendency of the present application.

Amendments to the Specification begin on page 3 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 4 of this paper.

Remarks/Arguments begin on page 10 of this paper.

Amendments to the Specification

Please replace the specification of the present application by the substitute specification submitted herewith.

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. – 16. (cancelled)

17. (new) A method for producing expandable particles of a styrene-modified linear low-density polyethylene-based resin comprising, in the order recited:

dispersing 100 parts by weight of non-crosslinked linear low-density polyethylene-based resin particles, 50 to 1000 parts by weight of a styrene-based monomer, and 0.1 to 0.9 parts by weight of a polymerization initiator relative to 100 parts by weight of the styrene-based monomer into a suspension containing a dispersant;

impregnating the styrene-based monomer into the low-density polyethylene-based resin particles by heating a resultant dispersion at such a temperature that polymerization of the styrene-based monomer does not substantially take place;

performing a polymerization of the styrene-based monomer at a temperature of (T-15) to (T-8) °C or (T+1) to (T+5) °C, T °C being a melting point of the low-density polyethylene-based resin particles; and

impregnating a volatile blowing agent into the resin particles during or after the polymerization;

whereby resin components of the expandable particles contain a gel component comprising less than 2 wt% of a graft polymer.

18. (new) The method of claim 17, wherein 50 to 300 parts by weight of a styrene-based monomer per 100 parts of resin particles are employed.

19. (new) The method of claim 17, wherein the non-crosslinked linear low-density polyethylene-based resin comprises a copolymer of ethylene and at least one of 1-butene, 1-pentene, 1-hexene, 3,3-dimethyl-1-butene, 4-methyl-1-pentene, 4,4-dimethyl-1-pentene, and 1-octene.

20. (new) The method of claim 17, wherein the styrene-based monomer comprises at least one of styrene, α -methylstyrene, vinyltoluene, and chlorostyrene.

21. (new) The method of claim 17, wherein 0.2 to 0.5 parts by weight of a polymerization initiator relative to 100 parts by weight of the styrene-based monomer are used.

22. (new) The method of claim 17, wherein the linear low-density polyethylene-based resin particles each have a substantially spherical shape or a cylindrical shape having an L/D of from 0.6 to 1.6, L being a length of each particle and D being a diameter of each particle, and an average particle size of from 0.2 to 1.5 mm.

23. (new) Expandable particles of a styrene-modified linear low-density polyethylene-based resin, wherein the particles are obtained by the method of claim 17.

24. (new) Expandable particles of a styrene-modified linear low-density polyethylene-based resin, wherein the particles are obtained by the method of claim 18.

25. (new) Pre-expanded particles having a bulk density of from 20 to 200 kg/m³, obtained by pre-expanding the expandable particles of the styrene-modified linear low-density polyethylene-based resin of claim 23.

26. (new) Pre-expanded particles having a bulk density of from 20 to 200 kg/m³, obtained by pre-expanding the expandable particles of the styrene-modified linear low-density polyethylene-based resin of claim 24.

27. (new) An expanded molded article having a density of 20 to 200 kg/m³, obtained by expansion molding of the pre-expanded particles of claim 25.

28. (new) An expanded molded article having a density of 20 to 200 kg/m³, obtained by expansion molding of the pre-expanded particles of claim 26.

29. (new) A method for producing expandable particles of a styrene-modified linear low-density polyethylene-based resin comprising, in the order recited:

dispersing 100 parts by weight of non-crosslinked linear low-density polyethylene-based resin particles, 30 to 300 parts by weight of a styrene-based monomer, and 0.1 to 0.9 parts by weight of a polymerization initiator relative to 100 parts by weight of the styrene-based monomer into a suspension containing a dispersant;

impregnating the styrene-based monomer into the low-density polyethylene-based resin particles by heating a resultant dispersion at such a temperature that polymerization of the styrene-based monomer does not substantially take place;

performing a first polymerization of the styrene-based monomer at a temperature of (T-15) to (T-8) °C or (T+1) to (T+5) °C, T °C being a melting point of the low-density polyethylene-based resin particles;

adding a styrene-based monomer and 0.1 to 0.9 parts by weight of a polymerization initiator relative to 100 parts by weight of the styrene-based monomer after the first polymerization has reached a conversion ratio of from 80% to 99.9%, and performing an impregnation of the styrene-based monomer into the low-density polyethylene-based resin particles and a second polymerization of the styrene-based monomer at a temperature of (T-15) to (T-8) °C or (T+1) to (T+5) °C, T °C being a melting point of the polyethylene-based resin particles; and

impregnating a volatile blowing agent into the resin particles during or after the polymerization;

a total amount of the styrene monomers used in the first and second polymerizations being more than 50 parts by weight and not more than 1000 parts by weight relative to 100 parts by weight of the low-density polyethylene-based resin particles;

whereby resin components of the expandable particles contain a gel component comprising less than 2 wt% of a graft polymer.

30. (new) The method of claim 29, wherein the non-crosslinked linear low-density polyethylene-based resin comprises a copolymer of ethylene and at least one of 1-butene,

1-pentene, 1-hexene, 3,3-dimethyl-1-butene, 4-methyl-1-pentene, 4,4-dimethyl-1-pentene, and 1-octene.

31. (new) The method of claim 29, wherein the styrene-based monomer comprises at least one of styrene, α -methylstyrene, vinyltoluene, and chlorostyrene.

32. (new) The method of claim 29, wherein 0.2 to 0.5 parts by weight of a polymerization initiator relative to 100 parts by weight of the styrene-based monomer are used.

33. (new) The method of claim 29, wherein the linear low-density polyethylene-based resin particles each have a substantially spherical shape or a cylindrical shape having an L/D of from 0.6 to 1.6, L being a length of each particle and D being a diameter of each particle, and an average particle size of from 0.2 to 1.5 mm.

34. (new) Expandable particles of a styrene-modified linear low-density polyethylene-based resin, wherein the particles are obtained by the method of claim 29.

35. (new) Pre-expanded particles having a bulk density of from 20 to 200 kg/m³, obtained by pre-expanding the expandable particles of the styrene-modified linear low-density polyethylene-based resin of claim 34.

36. (new) An expanded molded article having a density of 20 to 200 kg/m³, obtained by expansion molding of the pre-expanded particles of claim 35.

REMARKS

Entry of the foregoing amendments is respectfully requested.

Summary of Amendments

By the foregoing amendments claims 1-16 are cancelled and claims 17-36 are added, whereby claims 17-36 will be pending, with claims 17 and 29 being independent claims.

Support for the new claims can be found throughout the present specification (see, e.g., pages 6-21) and in the cancelled claims. In this regard, Applicants note that the term “particle(s)” recited in the instant claims is a more accurate translation of the corresponding Japanese term that was used in the originally filed PCT application (of which the present application is a National Stage) than the term “bead(s)” recited in the cancelled claims.

The amendments to the specification consist in the correction of grammatical/clerical errors and the replacement of the term “bead(s)” by the term “particle(s)”. As noted above, the latter term is a more accurate translation of the corresponding Japanese term that is present in the originally filed PCT application than the former term. Accordingly, pursuant to 37 C.F.R. 1.125(b), the substitute specification submitted herewith (clean and marked-up copy) includes no new matter.

Applicants point out that the substitute specification submitted herewith also incorporates the amendments made in the Amendment filed November 26, 2007.

Further, Applicants note that following the filing of a Reply Brief in co-pending related application No. 10/541,391 the Examiner provided a human English language translation of JP 01-284536 (see communication mailed February 12, 2009). Accordingly,

the Examiner is respectfully requested to make the human English language translation of JP 01-284536 officially of record on a Form PTO-892.

CONCLUSION

In view of the foregoing, it is believed that the instant application is in condition for allowance, which action is respectfully requested. If any issues yet remain which can be resolved by a telephone conference, the Examiner is respectfully invited to contact the undersigned at the telephone number below.

Respectfully submitted,
Hideyasu MATSUMURA et al.


Bruce H. Bernstein
Reg. No. 29,027

April 7, 2010
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

Stephen M. Roylance
Reg. No. 31,296